MA 2611, Term A 2014

Applied Statistics I

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Instructor

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1 Textbook

MA2611 is an introductory course in statistics. The text book is "Applied Statistics for Scientists and Engineers" by Petruccelli, Nandram and Chen (1999). However, to reduce cost, we have customised Chapters 1-11 for two courses. In MA2611 we will cover Chapters 1-6. We will spend about three weeks on Chapters 1-3 and four weeks on Chapters 4-6. However, each chapter is very long, and you are required to read much of the material. The first three chapters describe how to collect, summarize, and analyze data, and the other three chapters describe how to make inference about a population based on a sample using probabilistic arguments.

The course typically run with two teaching assistants (TAs) but this semester we are fortunate to have a post-doctoral scholar who will perform the activities of the two TAs. Henceforth, in this course outline, we will refer to the post-doctoral scholar as as the two TAs. The lectures of the instructor will pin down the key points, and it is the duty of the TAs and the students to work out the details.

2 Overall Goals and Expectations

1. Learn about statistics.
    a. Gain a knowledge of basic statistical concepts.
    b. Become a "critical thinker" about data.
    c. Learn the role of statistics in scientific investigation, in particular how to design and analyze experiments and sampling studies.
    d. Develop the skills to perform basic and appropriate data analysis and inference.
    e. Understand how to identify sources of variability, and deal with them.
    f. Become proficient in the use of SAS statistical software.
2. Improve skills for working with others. This is mainly achieved by the lab work and homework assignments.

3 Computers

In order to use the computers for MA2611 on campus, you must have a CCC windows computer account, which was probably given to you when you registered. If you do not have a computer account, please inquire at the helpdesk in WPI's Gordon Library.

The Mathematical Sciences Department Statistics Multimedia Classroom is located in 202 Kaven Hall, and it has 28 Pentium 4 PCs. There are also 25 Pentium 4 PCs housed in Stratton Hall (SH) 003, and you can use SH003 whenever it is available. However, during Term D 2012 we will be working in 202 Kaven Hall. Our premier statistical software, SAS, the state of the art, can be accessed from these PCs. Also, there are laser printers in the classroom available to you for free printing of your work in MA2611.

In addition to allowing you to use SAS, the CCC computer account will enable you to use electronic mail (email) to communicate with fellow students, your TAs and instructor (our email addresses are on the first page of this document). Please email the TAs first whenever you have questions, and restrict your email to the instructor. Please note that you are not mandated to use SAS. However, we will provide assistance in SAS, and we are not responsible for other software.

4 Course Activities

4.1 In-Class Learning Group Activities

At the beginning of the course, you will be asked to form yourselves into groups of three or four (preferably four). At least one group member should be able to use SAS. Those who cannot form groups on their own will be assigned to a group. These groups, called **learning groups**, will serve several functions during the course. One of these functions is to help you learn in lectures. For this course, these groups are the same groups used in the labs.

There are four scheduled lecture hours per week. During lectures, you may be asked to do some activity with your learning group, such as working out a problem, discussing a concept, or may answer a question jointly. If it is convenient, group members should sit together during the lectures.

4.2 Labs

There are two types of labs: computer-based and hands-on.

- Computer-based labs sometimes use computer simulation to answer "what if?" questions, such as "What if we add outliers to the data set: does the sample mean still work well?" Other computer-based labs use the power of computer simulation and computer graphics to give you a deeper understanding of statistical ideas and methods.

- Hands-on labs are intended to give you insight into the statistical ideas you are studying by having you generate data by hand and then providing activities using that data to illustrate those ideas.

Each chapter of the textbook has alloted a few labs, but we may do different labs and the labs may have to be finished outside of class. We will do at most one lab from each chapter, and it will be assigned a day or two ahead of time. The labs are meant to be done by a group (which for this course will be the learning group), even though some of them can be done by individuals. A lab report is required for each lab. This report may be done by the learning group; each group will submit one report.

4.3 Homework

Homework is assigned for your benefit and practice. You are to use it as a yardstick against which to measure your understanding. You are also expected to discuss it with the members of your learning group, as a check on your understanding. Note that this does not mean copying it from another group member. If you find the entire learning group's understanding does not measure up, then seek help from the TAs and the instructor. It is your and your learning group's responsibility to see that you understand the principles and ideas behind the homework exercises. We will allow up to two students to turn in a single homework report. Homework activities are important because they will help you to

- Gain a solid understanding of the course material;
- Be creative, and to think beyond the course material;
- Do the quizzes and the tests better.

So you should put a great individual effort to get the assignments correct. Homework will be assigned just after the appropriate material has been discussed. You are advised to start doing the homework problems immediately, so that you have enough time to think about them.

5 Performance Measures

Several performance measures are used in the course. This section describes each measure and what is expected of you for each.

5.1 Homework

Because homework activities are important for your individual control of the course material, this is a serious performance measure. Your homework report should be turned in on time, unless you have a special reason, in which case the due date can be extended a day or so. Students, who turn in sloppy homework report, will be cautioned. You should always use the course material and a statistical software (preferably SAS) to do the homework exercises.

5.2 Labs

Each lab requires a lab report. This report should be completed as a group lab report by the individual's learning group. Each lab report must clearly state the name(s) of the individual(s) who is (are) submitting it. Your grade for the lab will be proportional to the work you did on it; otherwise all individuals submitting a lab report will get the same grade. To give you an idea of what is expected in a lab report, you will be given a **sample** lab report.

There are two purposes for a lab report:

- To show that you understand the ideas the lab was designed to demonstrate.
- To help you develop written communication skills.

Lab reports must be neat: a first illegible lab report will be returned for rewriting; any subsequent illegible lab reports will be given a grade of 0. (One lab report is required from your group.)

5.3 Weekly Quizzes

The last ten to fifteen minutes of Friday's lecture will be devoted to an individual (not group) open book, open note quiz. The quiz is used to measure your knowledge of the most *recent* chapter's material. For this reason there will be *two* questions which require a good understanding of the material; each quiz consists of an essay-type question and one or two multiple-choice questions. You should bring a pocket calculator to each quiz.

5.4 Tests

There will be **two** open book, open note tests, one mid-term and one final, based on all the material covered so far. This is an individual (not group) exam and involves problem solving and reasoning and the analysis of data. Each of the two tests is multiple-choice, and it will consist of ten to fifteen questions. You should bring a pocket calculator to each test. The purposes of the tests in this course are:

- To obtain an individual measure of your understanding of statistical ideas.
- To obtain an individual measure of your ability to apply statistics.
- To provide an incentive for you to review the material individually.

There will be a practice test before each of the two tests and it will be given to you by the teaching assistants during the lab.

Because the tests are decisive in your final grade, you must work hard to do well in each of them.

5.5 Caution

Quizzes and tests are individual activities, and they are all open book. During these activities you will not be allowed to pass anything among your classmates. So if you want to open your book, notes, homework reports, lab reports, etc., **you must bring your individual ones to the quizzes and tests**.

6 Grading

Grades will be assigned as follows:

Group Activities	**Percent**
Lab Reports (4)	16

Individual Activities	**Percent**
Quizzes (4-5)	20
Test 1	20
Homework Sets (5-6)	19
Test 2	25

NOTE: The quizzes and the two tests account for 65% of the course.

Course Grades

A	At Least 85%
B	70% to 84%
C	55% to 69%

The instructor will deal with borderline cases when the final grades are obtained. However each piece of work, you are required to turn in, will follow the same grading scheme. So you can work out your own grades when they are not allocated.

7 Course Requirements

1. Attend and actively participate in class. This includes being prepared for each day's activities. (Class participation will help you think more critically about the material.)

2. Read all assigned materials. In particular, read all assigned material **before** the class in which that material will be discussed.

3. Submit all required homework assignments on time.

4. Participate in all labs and submit all required lab reports on time.

5. Pass both tests.

6. Participate in all weekly quizzes.

8 Your Expected Time Commitment

Over twenty years ago, when the WPI Plan was conceived, it was decided to require full time students to take only three courses at a time (at other schools four or five are a full load). The rationale was that students should be more responsible for their own learning, and therefore should put in the time required to be full time learners outside of class. The figure quoted was that students should spend (on average) seventeen hours per week per course. The Teaching Assistants and I will each put in about eighteen hours of work. You can count the four hours in class, the two hours in the lab, and any time you spend thinking about MA2611 at a cinema, baseball game or at any sporting event!

9 Disability

If you need course adaptations or accommodations because of a disability, or if you have medical information to share with me, please make an appointment with me as soon as possible; see my office hours on the first page of this document. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact the Disability Service Office (DSO) as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is located in the Student Development and Counseling Center, the phone number is 508-831-4908 and e-mail is DSO@WPI.EDU.

10 Academic Dishonesty

The website, http://www.wpi.edu/offices/Policies/Honesty, states "Any act that interferes with the process of evaluation by misrepresentation of the relation between the work being evaluated (or the resulting evaluation) and the student's actual state of knowledge is an act of academic dishonesty." See the website for the procedures associated with academic dishonesty.

11 Course Syllabus

Dates	**Activities**
August 28, 29, September 2	Chapter 1
September 4, 5, 8, 9	Chapter 2
September 11, 12, 15, 16	Chapter 3
Thursday, September **18**	**Test 1**
September 19, 22, 23, 25	Chapter 4
September 26, 29, 30, October 2, 3	Chapter 5
October 6, 7, 9, 10, 13, 14	Chapter 6
Thursday, October **16**	**Test 2**

Important Routine Dates

Dates	**What is due?**
Fridays (after lecture)	HW report
Fridays (last 10-15 minutes)	Quiz
Thursdays	Lab report

Good Luck !!!